CLAIMS

We claim:

1. A fuel cell power plant system, comprising:

a fuel cell having a first electrode that receives a fuel including hydrogen and a second electrode that receives an oxidant from a supply and outputs exhaust;

an enthalpy recovery device having a first portion in fluid communication with the exhaust of the second electrode and a second portion in fluid communication with the air supply between the supply and the second electrode; and

a controller that selectively controls the amount of fluid communication to at least one of the portions of the enthalpy recovery device based upon a selected condition.

2. The system of claim 1, wherein the controller prevents the first portion from receiving the exhaust from the second electrode when the selected condition exists and wherein the selected condition comprises a temperature being below a selected threshold.

3. The system of claim 1, wherein the controller prevents the second portion from receiving the oxidant from the supply when the selected condition exists and wherein the selected condition is at least one of a temperature being below a selected threshold or a system start up operation.

4. The system of claim 1, including an exhaust conduit that directs exhaust from the second electrode to the first portion, a bypass conduit that directs the exhaust away from the first portion and a valve associated with the conduits, the controller operating the valve to selectively allow the second electrode exhaust to flow to the first portion.

5. The system of claim 1, including an oxidant supply conduit that directs oxidant from the supply through the second portion to the second electrode, a bypass conduit that directs the oxidant from the supply directly to the second electrode and a valve associated with the conduits, the controller operating the valve to selectively allow the oxidant from the supply to pass through the conduits to control oxidant flow through the second portion.

6. The system of claim 1, wherein the controller selectively reduces the amount of fluid communication to at least one of the portions of the enthalpy recovery device based upon at least one of a temperature or a pressure within the system.

7. The system of claim 1, including an oxidant heater and wherein the controller selectively controls the oxidant supply such that the oxidant is at least partially heated by the oxidant heater prior to being provided to the second portion.

8. The system of claim 7, including a fuel processing device that has a heat exchanger through which the fuel passes prior to being provided to the first electrode and wherein the oxidant heater comprises the heat exchanger.

9. The system of claim 1, including a heater associated with the enthalpy recovery device.

10. The system of claim 9, wherein the heater heats coolant from the second electrode and wherein the heated coolant and inlet oxidants flow together within the enthalpy recovery device.

11. The system of claim 9, wherein the heater comprises at least one resistive element that produces heat responsive to current supplied to the element, the heat from the resistive element warming at least one of the portions.

12. The system of claim 9, wherein the first and second portions of the enthalpy recovery device comprise a conductive material and the heater comprises at least one electrical connection between one side of the first portion and one side of the second portion, the electrical connection allowing current to pass through the first and second portions.

13. The system of claim 9, including a cooler associated with the fuel cell that exhausts heated coolant and wherein the heater comprises at least one heater element associated with the enthalpy recovery device, the heater element receiving the heated coolant from the cooler.

14. The system of claim 1, including an exhaust burner that processes exhaust from the first electrode and wherein an output from the exhaust burner is selectively supplied to the first portion of the enthalpy recovery device.

15. A method of operating an enthalpy recovery device in a fuel cell power plant where the enthalpy recovery device has a first portion that is in fluid communication with exhaust from the fuel cell and a second portion in fluid communication with an oxidant supply to the fuel cell, comprising:

selectively controlling an amount of fluid flow through at least one of the portions of the enthalpy recovery device based upon a selected operation condition.

16. The method of claim 15, wherein the operation condition comprises temperature and including at least partially bypassing at least one of the portions of the enthalpy recovery device when the temperature is below a selected threshold.

17. The method of claim 16, including completely bypassing at least one of the portions.

18. The method of claim 17, including allowing moisture or liquid within either of the portions to freeze.

19. The method of claim 15, wherein the selected operation condition is a start up of the fuel cell and including completely bypassing the second portion during the start up.

20. The method of claim 15, including preheating the oxidant from the oxidant supply before the oxidant is provided to the second portion.

21. The method of claim 15, including heating the enthalpy recovery device.

22. The method of claim 15, including heating the fuel cell exhaust and introducing the heated exhaust into the enthalpy recovery device with the oxidant.